



ACUTE LYMPHOBLASTIC LEUKEMIA (ALL)

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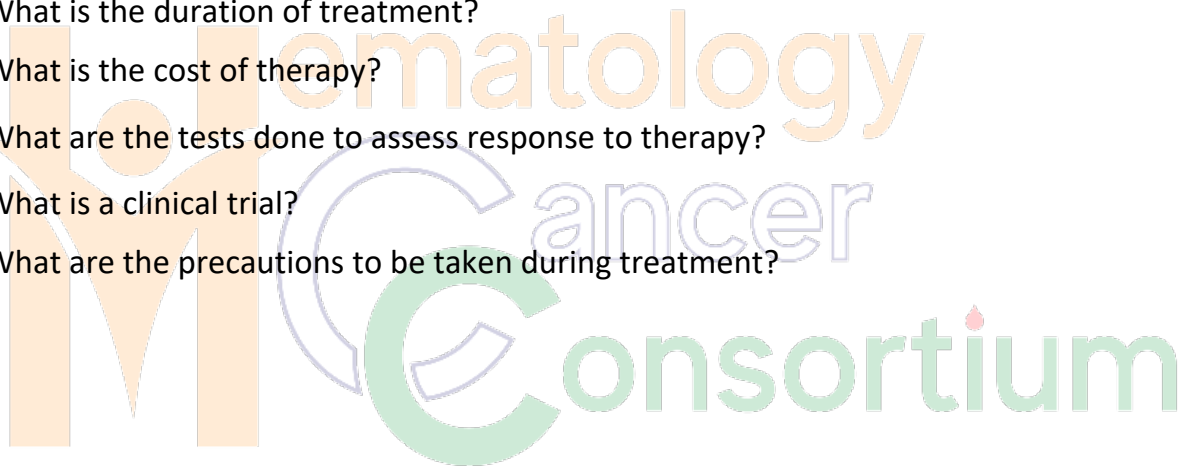
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- **Introduction**

Acute Lymphoblastic Leukemia (ALL) is a type of blood cancer.

Blood contains red blood cells, white blood cells and platelets. These arise from a substance called bone marrow which is present inside most bones in the human body.

In ALL, some of the white blood cells called lymphoid cells become abnormal and start multiplying uncontrolled. These abnormal cells impair immunity which leads to infections. They also cause damage to normal blood cells and organs. Reduced normal blood cells can cause bleeding. These situations can become life-threatening and leads to death in days to few months if no treatment is started as soon as possible.

- **Who is affected by this disease?**

ALL can affect both children and adults. ALL is the most common type of childhood cancer in children under the age of 15 years. The risk of getting ALL in adulthood increases from the age of 50 years onwards.

- **What are the causes and risk factors?**

ALL starts with a change to a single cell in the bone marrow.

No specific causes for ALL have been identified. Some risk factors include:

- Exposure to radiations (X-rays etc)
- Harmful chemicals from industries (benzene etc)
- Previous treatment for cancers

ALL is not contagious. It does not spread from one person to another by touch or physical contact

- **What are the symptoms and signs?**

- Feeling tired and weak
- Fever which does not go away
- Easy bruising, black-red spots on the skin, bleeding from the gums
- Looking pale
- Reduced appetite
- Small swellings in the neck and armpits
- Body aches and pains (sometimes so severe that children refuse to walk)
- Nausea and vomiting
- Unexplained fall in hemoglobin , very high or low white cell counts or fall in platelet counts detected incidentally may be the first manifestation

It is important to note that these findings are not specific for ALL. They can be seen with other diseases also.

- **What are the tests done?**

- Blood tests to look at the number of red blood cells, white blood cells and platelets. (CBC-complete blood count, peripheral blood smear)
- Bone marrow test to confirm the presence of the cancer/ ALL cells. (Bone marrow aspiration and biopsy)
- Blood tests to assess how different organs like kidneys and liver are performing. (kidney and liver function tests)
- Blood tests to indicate harmful substances being released by the cancer cells.
- Lumbar puncture is done from the lower back to collect a sample of the fluid that surrounds the spinal cord so it can be checked for the presence of cancer cells.
- Depending on the age and sex, the treating doctor may choose to do a heart scan (echocardiogram), abdomen scan (ultrasound scan of the abdomen and scrotum) or a CT scan

- **How is the diagnosis of ALL confirmed?**

- Leukemic/ ALL cells are called 'blasts'. Confirmation of ALL is based on detecting the presence of these abnormal cells or blasts and their percentage in the blood or bone marrow.
- Using the blood or bone marrow, two tests are performed:
 - Immunophenotyping - this test identifies the ALL cells as B cells or T cells
 - Cytogenetic analysis - this test examines the chromosomes of the ALL cells for defects. Chromosomes contain genes which give instructions to the cells.

Immunophenotyping and Cytogenetic analysis help in making important decisions in the treatment of ALL.

- **What is the treatment for ALL?**

Various institutions follow different treatment regimens which are built on similar treatment principles.

ALL is treated with chemotherapy. Chemotherapy means treatment with powerful medications which destroy cancer cells. They may be given by mouth, injection, or through a tube (IV) that's often put into a vein in the arm or chest.

- **How long will I be under treatment?**

In ALL, the chemotherapy is given in three different phases:

- Induction - This is the first round of chemotherapy which lasts for **4 to 6 weeks**. Patients may have to remain admitted in the hospital during this phase frequently. The drugs used in this phase are daunorubicin, vincristine, l-asparaginase, dexamethasone and prednisolone.
- Consolidation - To strengthen the control over the ALL, further chemotherapy is given in cycles. It may be combined with radiation therapy. The consolidation phase lasts up to **6 months**. The drugs which are used during consolidation are methotrexate, cyclophosphamide, doxorubicin, etoposide, cytosine, dexamethasone and prednisolone. In certain cases consolidation may be in the form of a bone marrow stem cell transplant.
- Maintenance - This phase lasts for **2 years**, during which chemotherapy may be given once a month with medication that is taken orally on some days of the week. Most patients can do their regular day to day activities as well as join work or school during this phase. The drugs which are used during consolidation are methotrexate, vincristine, mercaptopurine and dexamethasone.

Supportive treatment

- Red blood transfusions and platelet transfusions- most of this requirement is during the first few weeks of treatment. The family may have to arrange blood and platelet donors for it.
- Antibiotics to help prevent and fight infections
- Growth factors are injectable drugs that increase the number of white blood cells and are given when the WBCs are low.
- Allopurinol and Rasburicase are drugs which may be used for tumor lysis
- Dialysis may be required in patients who develop kidney failure.

- **What is the duration of treatment?**

The treatment as discussed above lasts for 2 years. If no major problems occur, patients may require up to 4 weeks of hospital stay during the initial induction phase. Subsequent chemotherapy goes on with weekly visits to the hospital as out-patient care. However often patients are advised to stay near their treating doctor/hospital for initial 6 months. This is because emergency admission may be frequently required specially if there is fever with low WBC counts during initial few months of treatment. This is a potential life-threatening situation which needs treatment with IV antibiotics.

- **What is the cost of therapy?**

The approximate cost of chemotherapy ranges from 4 to 6 lakh INR provided there are no major complications but may go much higher if there are complications or the disease is high risk. Charges will also depend on the institution delivering the treatment. The details will be discussed by the treating doctor.

- **What are the tests done to assess response to therapy?**

Remission is the control gained over the cancer after chemotherapy. If there is no or minimal residual blood cancers cells after chemotherapy, the disease is said to be in remission.

After completion of the induction treatment, a bone marrow assessment is done to check the remission status. If the disease is in remission, the treatment still needs to continue as per treatment protocol.

Hemoglobin, white blood cells and platelets and kidney and liver functions are monitored at regular intervals.

After completion of 2 years of treatment, the blood tests and regular clinical examinations are done to monitor the disease control usually once every 3 months up to a period of 5 years.

- **Is there a possibility of cure?**

B cell ALL in children is often curable.

In children older than 15 years of age and adults, the possibility of cure will be discussed based on parameters assessed at diagnosis.

If the disease is not in remission or if the disease comes back, high dose chemotherapy, radiation and immunotherapy followed by a bone marrow transplant would be required to establish disease control.

In certain situations, enrollment into a clinical trial may be suggested.

- **What is a clinical trial?**

A clinical trial is an experiment conducted to test new drugs and treatment regimens for a particular disease condition. Different doses of existing drugs and new combinations are also studied.

Clinical trials are conducted for newly diagnosed patients or those who are unable to achieve remission or those who do not respond to standard chemotherapy.

A patient can be enrolled into such a trial if requirements are satisfied. Eligibility and enrolment criteria of such trials may be discussed with the treating doctor.

- **What are the common side effects of chemotherapy?**

Common side effects of chemotherapy that are seen during treatment are given below:

- Low WBC counts may lead to infections. Fever is the commonest indication that patient has developed infection and needs urgent treatment.
- Low platelets - bleeding manifestations such as gum bleeds, black-red spots on the skin, blood in urine or stool
- Low hemoglobin and low red blood cells - anemia

Chemotherapy affects parts of the body where new cells form quickly. Side effects related to this manifest as:

- Nausea/ vomiting
- Hair loss
- Ulcers in the mouth
- Skin rashes
- Loose motions
- Constipation
- Discoloration of nails
- Tingling and numbness in hands and feet

Late and long-term effects seen in patients treated for ALL include:

- Infertility
- Heart problems
- Lung problems
- Thyroid problems
- Fatigue
- Bone problems
- Trouble concentrating
- Abnormal or loss of sensation in the hands and feet (peripheral neuropathy)
- Learning difficulties in children
- Growth problems in children

- **What are the precautions to be taken during treatment?**

- Consume healthy home made freshly cooked food
- Avoid uncooked food items - raw vegetables, fruits, dry fruits etc
- Drink water from a reliable source which can be either boiled and cooled or filtered-purified water
- Drink plenty of fluids to remain well hydrated

- Avoid visits to crowded areas and enclosed spaces - marriage halls, movie theaters etc
- Entertain less or no visitors
- Avoid flowers and pets
- High intensity workouts and contact sports should be avoided. However complete inactivity/bed rest is also not good. Light physical activity like walking, yoga is beneficial and is encouraged.
- Maintain proper hygiene. Daily brushing of teeth with baby-soft tooth brushes, use of antiseptic mouth gargles after eating anything, daily bathing and wearing clean clothes , cleanliness of private parts is important to prevent infections.
- Maintain a diary of your weight once or twice a week and discuss with your doctor if there is loss or gain in weight in case he is not already aware of it.

Newer treatments for ALL may become available after this booklet is published. The treating doctor will be able to provide information about such developments or the HCC website can provide more information about the same.

